THE EFFECT OF GIRDLING ON ROOTING OF HIBISCUS

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Many plants are propagated by cuttings; this involves cutting off a piece of stem and placing it in a suitable medium until it forms new roots. The natural ability of a cutting to form roots can in most instances be altered by chemical treatments, wounding or girdling. A plant stem consists of two major portions, the inner woody part called the xylem and the softer outer portion called the phloem. The xylem is primarily concerned with carrying water and mineral nutrients from the soil to the upper parts of the plant while the phloem is mainly involved in carrying food and other manufactured materials downward. Girdling as used here involves removing a ring of phloem tissue to stop the downward movement of materials thus causing these materials to accumulate in the stem above the girdle. This procedure increases the rooting ability of most cuttings and is also used to root cuttings attached to the mother plant as in "Marcotting" or "Chinese pot layering". Girdling is also used with other types of layering (i.e. serpentine and mound) and has been used to increase the "take" scions difficult to graft.

Because rooting is consistently increased as the result of girdling, some factor(s) may be assumed to accumulate and/or to be induced to form by this treatment. The reasons most often given for improved rooting of girdled stems are an accumulation of carbohydrates (food materials) above the girdle, increased auxin (growth hormone) content at the base of the girdled region, or to other factors--notably rhizocaline (a specific material for root formation) or members of the rhizocaline complex (a number of

materials acting to form roots). Rooting cofactors were determined as a part of this study and are considered to be the same as, or a part of the rhizocaline complex. This study was undertaken to determine what changes are occurring in the phloem (bark) tissue immediately adjacent to the girdled area in a difficult-to-root and easy-to-root hibiscus variety and to relate them to root formation.

Since the removal of a ring of bark interrupts the downward flow of materials from the leaves and/or buds, samples can be harvested at various time periods and the change in amount of materials in the bark tissue above and below the girdled region can be determined for a specific time. Because roots originate only on the bottom of a stem, the amount of materials accumulating in the 1/2-3/4" of tissue immediately above the girdle was investigated. An equal quantity of tissue from below the girdle was also analyzed so that comparisons could be made at each time the tissues were sampled.

The information gained from this study can also be applied to cuttings placed in a propagating medium since a girdled stem is in many respects comparable to a cutting, the major difference being that a girdled stem can obtain some nutrient materials in addition to water through the intact xylem tissue. The use of girdled stems for this experiment avoided three complicating factors involved in placing cuttings in a propagating medium; 1) materials moving down the stem from the leaves could be lost through the basal cut surface and reduce the rooting effect; 2) etiolation (growth which takes place in the dark) which occurs on the lower portion of a cutting placed in a propagating medium increases the rooting response, and 3) the water film around the base of a cutting also promotes rooting.

Two varieties of Hibiscus rosasinensis L. were chosen to study the effect of girdling upon rooting, a red variety (name unknown) which is easy-to-root and Wilson's White which is difficult-to-root. Both